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ZOOLOGY.

The Relation of Nuclei and Cyptoplasm in the Intestinal Cells of Land Isopods.[1]—Somewhat more than two years ago the late Professor Ryder and Miss Pennington (Anat. Anzeiger, Bd. IX, Nr. 24 & 25) announced the discovery of the fact that nuclei in the adjacent cells of the intestinal epithelium of *Porcellio* may become amoeboid, wander toward each other, and in some cases fuse together. This surprising fact the authors mentioned interpreted as a non-sexual form of conjugation; and, while recognizing its unique character, did not doubt that it was a normal phenomenon, even suggesting that it might have some relation to sexual conjugation.

Owing, however, to the entire novelty of these observations and interpretations the paper was received by many persons with considerable reserve. One author, W. Schimkewitsch (C. R. Soc. Natural., St. Petersbourg, 1895, I, and Biolog. Centralblatt, Bd. XVI, Nr. 5), while confirming the observation, denied that the nuclear fusion was a normal phenomenon. He interpreted it not as a form of nuclear conjugation but simply as as an artifact.

In the course of a study of amitosis, upon which I was engaged, it occurred to me that the phenomenon is question might be an irregular form of direct nuclear division; and with the approval of Dr. Mary Pennington, the junior author of the paper first mentioned, I undertook a review of that work.

My observations began with *Porcellio*, and were then extended to *Oniscus* and *Armadillidium*. On the whole the results of this review confirm the conclusions of Schimkewitsch. The phenomenon, which may be readily observed, is in most cases neither a form of nuclear conjugation nor division, but simply an artifact. I was first impressed with the fact, as was also Schimkewitsch, that in the most carefully preserved preparations relatively few of these so-called "conjugating nuclei" were found; on the other hand, in cases where the intestine was cut open before fixation, or was in other ways roughly handled, many of them occurred.

The shape and structure of these nuclei is such as to suggest the idea that they have been squeezed out of shape by some sort of pressure. They are most frequently long and pointed, with the chromatic substance condensed at one end, and with an empty nuclear membrane at the other, Figs. 1, 2 and 3. In some cases these nuclear processes are forked or branched, in others they are uniaxial. In adjacent cells the axes of nuclear elongation are frequently parallel; sometimes they radiate more or less regularly from a common area. The chromatic substance within these elongated nuclei is usually drawn out into rods or threads, which are parallel with the axis of elongation, Fig. 3. They frequently extend through several cells, and in a few cases were observed to protrude through the coelomic parietes of the cells. They show no marked tendency to fuse with each other, their long processes frequently passing through two or three cells without fusing with the nuclei of those cells. They are no more abundant in animals, which have been starved four weeks, and in which the alimentary canal has been for a long time entirely empty, than in animals which are well fed. In many cells the nuclei are broken up into several fragments, Fig. 2, each of which, though possessing no part of the original nuclear membrane, is yet sharply marked off from the cytoplasm. In all such cases the nucleus shows its characteristic staining reactions; in fact, the nuclear substance, though flowing through the cytoplasm, does not mingle with it. In general the nucleus and cytoplasm behave like two fluids, which are not miscible, *e. g.*, oil and water. In some cases, however, which will be described a little later, the substances of the nucleus and the cytoplasm appear to mingle at a definite point in the cell, and this under what seems to be normal physiological conditions.

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[1] Contributions from the Zoological Laboratory of University of Pennsylvania, No. VI.

The view that these distorted nuclei are squeezed from one cell to another is still further supported by the fact that the coelomic, and especially the luminal walls of these intestinal cells, are strong and thick, while sections show that in most regions the parietal walls are so thin that they cannot be distinguished; the nuclei might therefore easily pass through these parietal walls. The apparently well-marked cell boundaries which one observes in surface views of the intestine are really the superficial muscle fibres which run in the furrows between successive rows of cells.

I was at first inclined to attribute the source of the presumable pressure by which these bizarre forms of nuclei were produced to the contraction of these circular and longitudinal muscle fibres which, especially in the posterior portion of the alimentary canal, lie with great regularity between the successive circular and longitudinal rows of cells. The fact, however, that these abnormal nuclei may occur singly or in very narrowly circumscribed areas, and do not usually follow the lines of a single muscle fibre, whereas the fibres most probably contract as a whole, led to the abandonment in the main of this view.

A study of sections of the intestine show that almost every cell, and especially those in the anterior region of the alimentary canal, is traversed by bundles of very strong fibres, which run from the luminal to the coelomic side of the cell, and inclose the nucleus as in a barred cage, Fig. 4. These fibres when cut across curl slightly at the ends, showing that they are elastic; and it is possible that they may, under certain circumstances, contract, thus forcing the nucleus out through the bars. The presence of these fibres certainly explains the irregular and branched, or even broken appearance, which the nuclei often present.

Experiment, however, demonstrates the fact that the principal, if not the only cause of these distorted nuclear forms, is merely the mechanical pressure incident to the ordinary methods of removing the intestine from the body. I find that by pulling off the head segment and then carefully separating the tail segment from the next anterior one the intestine can be slipped out of the body, generally without injury, simply by pulling on the tail segment. I have prepared many such specimens which do not show a single distorted nuclear form. If now an intestine so removed be gently pressed in several spots with a blunted pencil, the distorted nuclei are found, after staining and mounting, to be located immediately around these spots. If the entire alimentary tract be gently pressed with a spatula, every nucleus may be caused to take this form. I believe, therefore, that these distorted nuclei are largely, if not entirely, the result of mechanical pressure produced by contact with foreign objects. Whether cells which have undergone such pressure may afterwards restore their nuclei to a normal condition, or regain them, if altogether lost, is a question which I am now investigating.

In some cases in which the intestine was removed with the most pains-taking care a few cells were found in which a normal looking nucleus extending into two cells, Fig. 8. Some of these cases, I am convinced, are amitotic divisions of the nucleus; *e. g.* figures 7 and 8 show cells which are indented on the cœlomic side and in which the nuclei are dumb-bell shaped. That this is not a case of "conjugation" is evidenced not only by the shape of the cells but also by their size, for they are scarcely any larger than single neighboring cells. On the other hand there are many cases in which nuclear forms which might be mistaken for amitotic division figures are plainly proclaimed to be squeezed nuclei by the absence of a nuclear membrane from one end, Fig. 3.

There remains to be described the remarkable structure of some cells which, I believe, are entirely normal. In the anterior region of the alimentary canal the luminal side of each cell is covered by a very thick coat of chitin. Through this chitin run a great many minute channels which unite to form larger channels and ultimately open into the cell. The space into which they open is filled with a homogeneous, non-granular substance which stains an intense black in iron hæmatoxylin. This substance is limited to the space lying between the nucleus on the one side and the chitinous wall on the other and it evidently fills the channels which penetrate this wall. Its appearance is very different from ordinary cytoplasm and I believe it is a form of secretion which is being elaborated by the cell to be poured through the channels mentioned into the alimentary canal. The proximity of the nucleus to this substance, as well as the aggregation of the chromatin on the side of the nucleus next to it, suggests that the nucleus must play an important role in its formation; the nuclear membrane, however, is intact on all sides.

In that portion of the intestinal wall on the ventral side immediately posterior to the well developed typhlosole the nuclear membrane is in all cases excessively thin on the side of the cell next the lumen, and it is usually drawn out into finely pointed processes which become continuous with the cyto-reticulum. In several cases which I have observed the nuclear membrane is altogether wanting on this side of the nucleus, and in such cases it can be readily seen that the cyto-reticulum is continued into the nucleus, while the chromatin granules, which are densest toward the middle of the nucleus, become directly continuous with the large microsomes of the cytoplasmic net. This transition of chromatin granules into microsomes is most beautifully shown when a differential stain such as the Biondi-Heidenhain mixture is used. In such cases the chromatin granules within the nucleus are green, the microsomes are red, and between these the granules shade from one into the other through various tints of blue and lilac. It is of course possible that in this case the nuclear membrane may be ruptured owing to pressure. Against this view, however, may be urged the fact that the disappearance of the membrane always occurs at one point, viz. on the side next the lumen and furthermore there is no evidence of rupture, the *structures* of the cytoplasm being continued without interruption into those of the nucleus. I hold, therefore, that these cells normally show a direct continuity between cytoplasmic and nuclear structures, though I cannot at present explain the functional significance of this fact.

Finally in the cells of the dorsal wall posterior to the typhlosole the nucleus is deeply indented in certain cases on the side next the lumen, the chromatin is massed on the opposite side and the nucleus is very large and vesicular containing many irregular dark-staining masses or nucleoli, which are frequently vacuolated. On the luminal side the nuclear membrane becomes so thin that it is impossible to say whether it is continuous or not. Between the nucleus and lumen the cytoplasm is unusually dense and immediately outside of the nucleus it is massed into a dense darkly-staining substance, which projects by one or many processes into the cavity of the nucleus. These processes frequently contain vacuoles and in structure and staining qualities they exactly resemble the nucleoli. Frequently these processes are deeply constricted at the base as if they were about to be cut off and set free into the nuclear cavity, as indeed I believe to be the case.

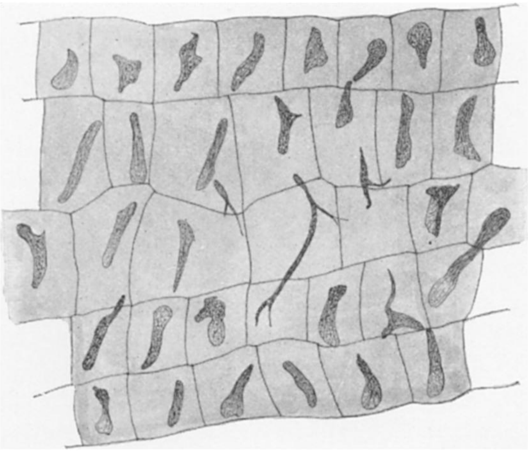
The general similarity of this process to the reception of food material by the egg of *Dytiscus* as observed by Korschelt is at once apparent. In this case, as in that, there is little doubt that the granular material is a nutritive substance, which, in the case of the Isopods, is taken up from the alimentary canal and sent up in a broad band to the nucleus, where it aggregates immediately outside the nuclear wall. Unlike the cases observed by Korschelt, however, this substance projects into the vesicular nucleus in the form of processes which appear to be cut off and set free within the nucleus. There are many reasons for believing that this substance projects into the nucleus rather than that the nucleus sends out pseudopodial processes into it. The nuclear wall is at this place so extremely thin as to be absolutely invisible in many places, and the nucleus itself is of such an open and vesicular character that it seems scarcely possible that it should actively send out processes into this densely granular mass. Moreover the evidence that these processes are set free into the nuclear cavity seems to me very good, though, perhaps, not absolutely convincing. I shall leave the consideration of the functional significance of this phenomenon to a future paper.

DESCRIPTION OF FIGURES.

Fig. 1. A small portion of the intestinal wall of Porcellio which had been gently pressed upon with a spatula. The entire intestine was similar to the bit here shown. Fixation, Corrosive-Acetic; stain, Biondi-Heidenhain; Obj. 8mm.; Occ. 4 (all the figures were sketched with a camera lucida under Zeiss Apochromatic lenses).

Fig. 2. Longitudinal section through dorsal wall posterior to typhlosole showing distorted nuclei. The contiguous cell boundaries are marked only by the circular muscle fibres which are seen in cross-section. Fixation, picro-formalin; stain, Biondi-Heidenhain; Obj. 3 mm.; Occ. 4.

PLATE II.



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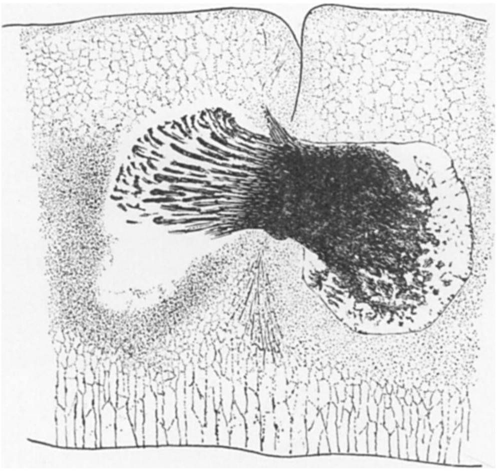

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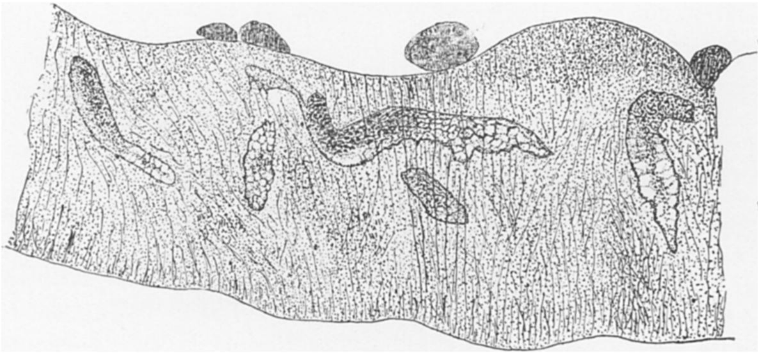
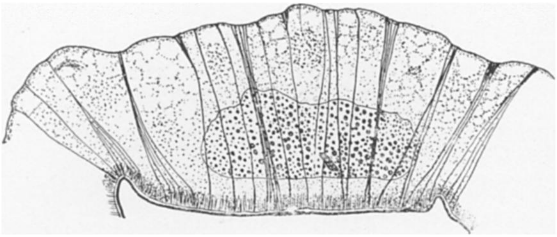


Conklin on Isopoda.

PLATE III.



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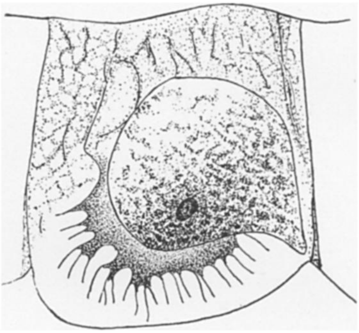

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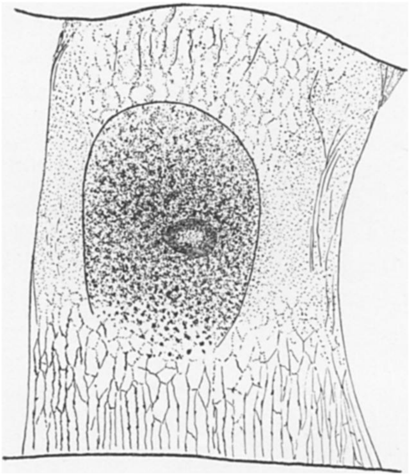

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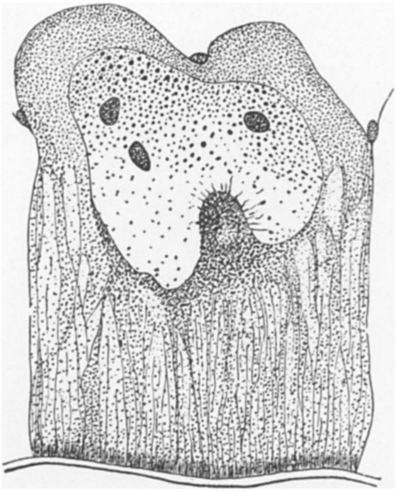
Conklin on Isopoda.

PLATE IV.



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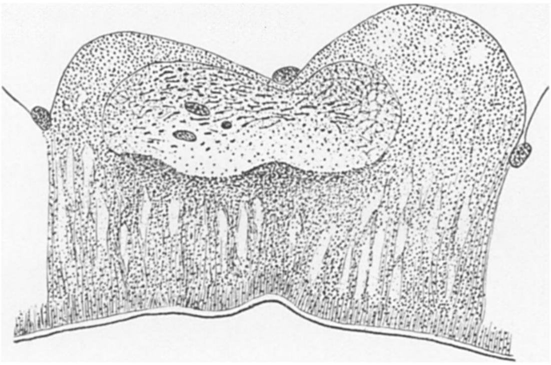

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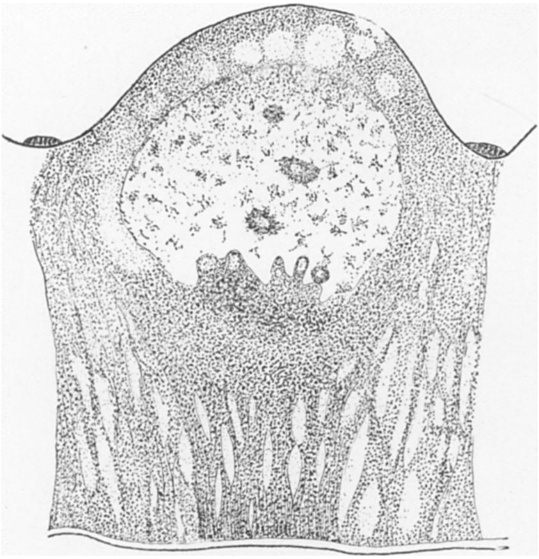

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Conklin on Isopoda.

Fig. 3. Cell from ventral wall near anus showing nuclear substance which has been forced from right to left in the figure. Fixation, Hermann's fluid; stain, iron haematoxylin; Obj. 3 mm.; Occ. 12.

Fig. 4. Section of elongated cell at dorsal margin of typhlosole showing fibres which traverse the cell. No lateral cell walls visible. The chitinous lining of alimentary canal is shown in double contour. Fixation, Flemming's fluid; stain, iron haematoxylin; Obj. 3 mm.; Occ. 12.

Fig. 5. Cell from region of typhlosole, dorsal side, showing the very thick chitinous wall (unshaded) which is perforated by many minute canals. Nucleus slightly distorted. Fixation, Hermann's fluid; stain, iron haematoxylin; Obj. 3 mm.; Occ. 12.

Fig. 6. Cell from ventral side posterior to typhlosole showing continuity of nuclear and cytoplasmic structures. The cyto-reticulum is very strongly marked on the side of the cell next the lumen. Fixation, Hermann's fluid; stain, iron haematoxylin; Obj. 3 mm.; Occ. 12.

Fig. 7. Cell from dorsal wall posterior to typhlosole showing an indentation on the coelomic side which is probably the beginning of cell division; the circular muscles are shown in cross section. A densely granular process of nutritive substance projects into the nucleus on its luminal side. Fixation, corrosive sublimate; stain, Biondi-Heidenhain; Obj. 3 mm.; Occ. 12.

Fig. 8. Cell from same region as preceeding figure, showing later stage of amitosis. Fixation, stain and magnification same as Fig. 7.

Fig. 9. Cell from same region as Figs. 7 and 8. Nutritive substance projects by many processes into nucleus, some of which contain vacuoles and are apparently being set free into nucleus to form nucleoli. Fixation, stain and magnification same as preceeding figure.

E. G. Conklin, University of Pennsylvania.

Myriapoda Climbing Vertical Glass Surfaces.—Dr. C. Verhoeff has been making experiments upon the climbing powers of *Polyxenus* and of juloid diplopods. His results show that unless the surface is such or is covered with some substance that gives a purchase to their claws the diplopods have not the power of climbing in the true sense of the word. They are only able to reach up the sides of a glass dish by using the last few segments of their body as a base of support. On the other hand the Polyxenids can climb. This fact, it may be noted, is patent to every one who has collected and kept them alive in a vial. They are invariably found in the neighborhood of the cork, ready to escape as each new one is put in. And it may be added that the pauropods can climb, though scarcely as well as *Polyxenus*. But what they lack in the power to climb clean, dry glass surfaces may, perhaps, be accounted for by the fact that these little fellows, dependent as they are upon respiration through a delicate cuticle, quickly succumb to dryness. I have watched individuals of both *Pauropus* and *Europauropus* as they ran up the sides of a vial or of a crystallizing dish, going easily where the surface was covered by fine particles of earth or humrus, and falling off where the surface seemed clean.—F. C. KENYON.

Lepidosiren articulata Not Distinct from L. paradoxa.[2]—Prof. E. Ray Lankester has lately made a study of the limbs of the various specimens of *Lepidosiren* conserved in the various European museums, and finds that in every case examined the skeleton of the limbs is not a continuous cartilaginous rod, but is composed of a series of articulated cartilages. This removes the difference that Ehlers supposed to exist between his specimens from Paraguay and those from the Amazon basin, and caused him to create the species *L. articulata.* To further show that the specimens from the two river systems are in all probability of the same species *L. paradoxa,* Prof. Lankester compared the specimens in head-length units, with the following result, which shows differences of no specific importance.

Brazilian, average: total length, 9.87; inter-membral, 5.25; post-membral, 3.5; cervico-dorsal, 3.21.

Paraguayan, average: total length, 9.75; inter-membral, 5.21; post-membral, 3.59; cervico-dorsal, 3.2.—F. C. KENYON.

The Regeneration of the Lens in the Eye of Triton.—Some two years ago we were astounded by the contents of a brief communication by Gustav Wolff in the Biologischen Centralblatte[3] bearing the title, "Remarks on Darwinism, with an experimental contribution to the Physiology of Development." In this the author brought forth the results of an experiment that flatly contradict one of the chief tenets of Weismann, inasmuch as he showed that the destruction of an organ formed from the ectodermic layer is followed by a regeneration of the structure from a layer of cells of mesodermal origin. In other words, the lens of the eye of *Triton tœniatus*, when destroyed, is reproduced by a lens that develops from the iris! Later on, Wolff published his final paper with illustrations.[4] But the work was in great need of confirmation. This has been done by Erick Müller,[5] who seems to have begun his task with as much skepticism as might be expected.

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[2] Trans. Zool. Soc., XIV., 11–24.

[3] Bd., XIV (1894), No. 17.

[4] Arch. f. Entwicklungsmechanik d. Organismen, I, 1895.

[5] Arch. f. mikr. Anat, xlvii (1896), 23–34.

The larvæ chosen varied from 3–6 cm in length. Each was held in a damp cloth to avoid injury, the cornea carefully slit with a scalpel and the lens removed without injuring the iris. Within one day changes were noted in the layer of cells composing the latter. The inner layer began to take on the appearance of embryonic cells. The cells began to loose their pigment, which was taken up and carried off by the leucocytes that began to fill the pupillar space. Then they began to increase in size and by the tenth day a small group of them, recognizable as a small swelling in the accompanying figure, copied in outline from the author's figure, had been pushed into the pupillar space. From this time on, the group of cells underwent all the changes recognizable in the normally developing lens. The posterior layer became much thicker than the anterior; its cells became more or less columnar and finally arranged themselves in concentric layers covered as a whole by the outer one-celled layer. By the fortieth day after the operation, the inner cells forming the inner three-fifths of the lens had lost their nuclei and become transparent. By the sixtieth day the regenerated lens had every appearance of a normal one.

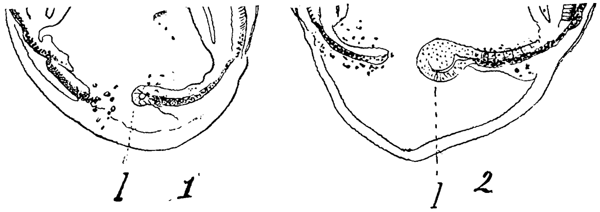

Fig. 1. I0 days after the destruction of the lens; showing the new lens, *l*, regenerating from the iris. Fig. 2, 18, days after the operation.

The changes were followed through from day to day and, as shown by the fifteen figures given by the author, seem conclusive.—F. C. KENYON.

The English Sparrow not Always a Nuisance.—It is gratifying to run across direct evidence that that feathered nuisance of our large cities, the English sparrow, does a little real good, after all that may be said against him. According to a late communication by S. D. Judd in the Auk, this sparrow has a fondness for the seeds of the common dandelion. Of all the seed-heads of this plant collected from a space of ground six feet in diameter, one hundred and thirty-five showed traces of the bird's beak.

The same author says that he has seen an English sparrow chase through the air, catch and devour a cicada. Catching insects that fly in a direct line does not seem to be a very difficult matter, but others able, like the dragon fly and flies generally, to dodge, as well as others of a naturally uncertain course, nearly if not always elude the bird's bill.

He also reports that the sparrow is very fond of picking up the insects injured or killed by the electric lights.—F. C. K.

The Origin of the Chiropterygium.—It has been said that the limb of the higher Vertebrates—Man, Reptile, Batrachian—does not exhibit the rayed structure of fishes. To explain this condition M. Mollier offers four possible solutions.

1. A single ray may have persisted and present segmentation is a secondary formation, all the other rays having degenerated.
2. Two rays only may have been preserved. Traces of these two rays would then be found in the forearm. The five fingers would be a secondary division, while a fusion of two rays would take place in the region of the humerus.
3. Five primitive segments might be represented, indicated both by the number of nerves together with the muscular buds, and by the number of the fingers.
4. The number of rays might be indefinite; they united to form a single mass, which ulteriorly underwent a secondary segmentation.

To the first hypothesis is opposed the fact that concentration is everywhere the rule, while this supposition would necessitate that the primitive outline, which had started from at least two segments, must enlarge.

As to the second hypothesis, embryology shows that the two bones of the fore arm develop from a single mass.

The third hypothesis rests on several concurrent conditions. But we find, according to M. Mollier, that the number five is not constant. Among the Batrachians, there are only three.

The only plausible theory then, is the fourth which agrees with all the facts of embryology which Mollier therefor accepts. (Revue Scientif. Sept., 1895, p. 340.)

A New White-footed Mouse from British Columbia.—During a collection trip in the northwest, Mr. Will C. Colt made several excursions to Saturna Island (in the Gulf of Georgia half-way between Victoria and Vancouver City), British Columbia, and secured there over two hundred white-footed mice. This enormous series, now in the Bangs collection, taken in January, February, March, April and May, 1894, represents a strongly marked and hitherto undescribed subspecies of *Peromyscus texanus*. The same form is probably found on all the islands and coasts of this vicinity, and agrees in its dark coloration with the whole fauna of this saturated region.

Through the kindness of Dr. C. Hart Merriam, I have been able to compare the Saturna Island series with a series of *P. taxanus gambellii*, belonging to the collection of the Department of Agriculture, from the type locality, Monterey, California. I have also made comparison with a large amount of material from Nicasio, California. Specimens from the latter place agree very closely with specimens from Monterey. The Saturna Island form is the darkest colored member of the *texanus* group, and is readily distinguished from either of its two nearest allies, *P. texanus gambellii* and *P. texanus arcticus*, by the peculiar sooty black of its upper parts. The new form may stand as:

PEROMYSCUS TEXANUS SATURATUS subsp. nov. *Type* from Saturna Island, B. C., No. 2581 ♂ old adult, coll. of E. A. and O. Bangs. Collected by Will C. Colt, January 31, 1894. Total length 190; tail vertebræ 94.5.

General Characters.—Size and proportion about as in *P. taxanus gambelli*, from which form it differs in being very much darker in color; the general tone of the upper parts sooty-black instead of yellowish-brown.

Color.—Upper parts sepia-brown, much intermixed with sooty-black, most intense on face and middle of back, paling off on sides; a narrow and indistinct band of cinnamon along lower sides; under parts grayish-white, the hairs deep plubeous basially; a black orbital ring; ears black, narrowly-edged with white; tail quite hairy, sharply bicolored, black above, white below; feet and hands white.

Size.—Average measurements of ten old adult specimens: total length 180.95; tail vertebræ 76.20; hind foot (from dried skin) 21.25.

Remarks.—*P. texanus saturatus* has a short tail, shorter than the head and body, and this character will always serve to distinguish it from any of the long-tailed mice with which it might be found, such as *P. austerus*, *P. macrorhinus* and *P. keenii*, all these having the tail longer than the head and body.—OUTRAM BANGS.

Some Bats from Lower California.—A small collection of mammals made by Mr. A. W. Anthony at San Fernando, Lower California, during April, May and June, 1894, includes four species of bats. All of these are interesting, on account of the locality at which they were taken, while one, an addition to the 'North American' fauna, is very slightly known.

In a paper on the birds of San Fernando (Auk, XII, April, 1895, p. 134) Mr. Anthony has given a detailed account of his collecting ground. "The region," he writes, "* * * has for its center the old abandoned copper mines of San Fernando, one league south of the ex-mission of the same name which is situated about twenty-five miles from the Pacific coast of the peninsula in about latitude 29° 30′. It has an approximate altitude of fifteen hundred feet above sea level, and is the center of one of the most barren of the Lower California deserts." Such a locality could not be expected to furnish a very extensive bat fauna. Hence the collector's notes on the habits of the animals under conditions apparently so unfavorable are of such value that they may be quoted entire for each species.

CHÆRONYCTERIS MEXICANA (Tschudi).—Mr. Anthony secured ten specimens of this species in the shafts of the abandoned mines. Southern Mexico has hitherto been the northern limit of the known range of this bat, which now finds a place in the fauna of 'North America.' The ten specimens, all but two of which are adults, measure as follows:

Number,	3240	3241	3242	3243	3244	3245	3246	3247	3248	3249
Sex,	♂	♀	♂	♂	♀	♀	♀	♀	♂	♀
Total length,	77	79	73	75	77	56	65	72	75	72
Tail vertebræ,	9.8	8	9.6		9	6	7.6	8.6	9	8.4
Free part of tail,	1.8	1.8	1.4		2	0.8	1	1.4	1	2
L. of interfemoral membrane from base of tail,	18	16	18		16	12	15	16.4	16	15
Occiput to tip of nose,	32	32.4	33		32	26	28.6	32	30	32
Nose leaf: height,	5.4	5	5		5.4	3.8	4	5	4.2	4
Nose leaf: width,	4.8	4.6	4.4		4.4	3.4	3.4	4.8	4	4
Ear from meatus,	17	16.2	14.8		14.4	14	14	15	16	15
Ear from crown,	10.8	11	10.4	10	10	8	9.2	10	10	10
Tragus: height,	6.4	6	5		5	5	4	5	5	6.2
Tragus: width,	2.8	2.4	2.4		2.4	2	2	2	2 6	2.8
Forearm,	44	40	43.6	43	44	38	43	43	40	43
First digit,	10	8	8		8.8	10	9	9.8	8	10
Second digit,	40	38	36		37.4	23	35	37	36	37.6
Third digit: metacarpal,	41.4	42.6	38	35.6	41	29	38	41	40	41
first phalanx,	17	17	16.6	16.5	17.4	12.6	16	16	16.4	17
second phalanx,	21.4	22	19	21.6	21.4	15	19	21	20.6	20
third phalanx,	10.4	10.6	11	11.4	11	8.4	10.4	11	12	11.8
Fourth digit: metacarpal,	38	39	36	37.6	39	27	34	37	37	36
first phalanx,	12	12	11	10.6	12	9.4	11	11.6	11.8	11.4
second phalanx,	15	15.4	14	13.9	14.6	11	14	15	14	14
Fifth digit: metacarpal,	37	38	36	36.8	37	28	34	36	35	36.4
first phalanx,	10	10	10	9.6	10.4	8.8	10	10	9.4	10
second phalanx,	13	14	12	12.7	13	10	12	12	13	12.4

"This bat I never saw flying about in the evening. One came into my cabin one night about 9.30, but with this exception, I never saw one outside of the shafts and tunnels of the mines. Here they were fairly common and usually found near the mouth of the opening—frequently where the sun could reach them at some hour of the day. When disturbed during the day, they usually took to the open air, and either sought shelter in one of the old buildings about the shaft, or flew into one of the abandoned shafts near by. They showed a marked preference for the light, but if pursued took to the lower levels and for a number of days did not venture from that Stygian darkness that *Vespertilio*[6] seemed to prefer. In flight they were quick and strong—more so than any other bat I have met with. I think they seemed to see well even in bright sunlight, and were by no means easy to secure after being driven from the mine.

"In fresh specimens the tongue is very similar to that of *Dryobates*, being extensible for at least an inch and a half and also barbed, though of course the barbs are soft."

ANTROZOUS PALLIDUS (Le Conte).—Five specimens.

"The large, pale bat I only took in the cabin. They frequently came in through the open door and were secured with a shingle."

VESPERTILIO NITIDUS H. Allen. Three specimens. As Mr. Anthony did not distinguish between the species of *Vespertilio* and *Vesperugo* in his collection it is probable that his notes refer in greater part to the latter.

"*Vespertilio* is the only bat I saw during the evening. They usually came out early, but owing to their habit of flying through the brush very low (3–6 ft. above the ground) they were hard to shoot. During June I found them catching insects about the tops of the cardones and shot several. One was found under a plank where it had crawled to spend the day. They were common in the mine, seeking the deeper levels where it was very dark, in marked contrast to the leaf-nose [*Chœronycteris*] the only other species found under ground."

VESPERUGO HESPERUS H. Allen. Seven specimens which the collector did not distinguish from *Vespertilio nitidus*.—GERRIT S. MILLER, JR.

Deaths from Wild Mammals and Snakes in India.—From the annual report for 1895 of the government of Madras[7] one learns that 1923 persons were killed by wild mammals and snakes, and that of these, 277 cases are attributed to wild mammals and the rest, 1646, to snakes. It is possible that the deaths reported from snake bites may be due to poisoning from other sources. The deaths caused by wild mammals are shown to be:

4 from elephants.
177 from tigers.
64 from panthers or leopards.
12 from bears.
10 from wolves.

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[6] In his notes Mr. Anthony does not distingush between *Vespertilio nitidus* and *Vesperugo hesperus*.

[7] The Zoologist, September, 1896.

2 from hyenas.
8 from other mammals.

Of these deaths, 85 occurred in the district of Ganjam and 73 in Visagapatam. In Ganjam much of the destruction was due to a man-eating tiger.

The largest number of deaths from snake bites occurred in Chingleput, North Arcot, South Arcot, Tanjore, Trichinopoly and Salem, from which districts 58 per cent of the total number were reported.—F. C. K.

The Number of Living Animal Species.—For the benefit of the curious, as well as the zoological student, the following table giving the census of the animal kingdom as known in the years 1830, 1881 and 1896 is inserted. The first two columns are taken from a note by A. Günther, in Annals and Magazine of Natural History,[8] and the last from a note in The Zoologist.[9] The last was compiled in February (1896) by the contributors to The Zoological Record.

		1830	1881	1896
Mammalia,		1,200	2,300	2,500
Aves,		3,600	11,000	12,500
Reptilia,		443	2,600	4,400
Batrachians,		100	800	
Fishes,		3,500	11,000	12,000
Tunicata,		. .	. .	900
Mollusca,		11,000	33,000	50,000
Brachiapoda,		. .	. .	150
Bryozoa,		. .	. .	1,800
Crustacea,	1840	1,290	7,500	20,000
Arachnida,		1,400	8,000	10,000
Pycnogonida,		8	70	
Myriapoda,		450	1,300	3,000
Protracheata,		. .	. .	
Hexapoda,		49,100	220,150	230,000
Vermes,		412	6,090	6,150
Echinodermata,		230	1,843	3,000
Cœlenterata,	1834	500	2,200	2,000
Spongiæ,	1835	50	400	1,500
Protozoa,		305	3,300	6,100
		71,588	311,553	366,000

It may be noted that among the mollusca, the tunicates, brachiopods and bryozoa were probably included in the 11,000 and 33,000 of the first

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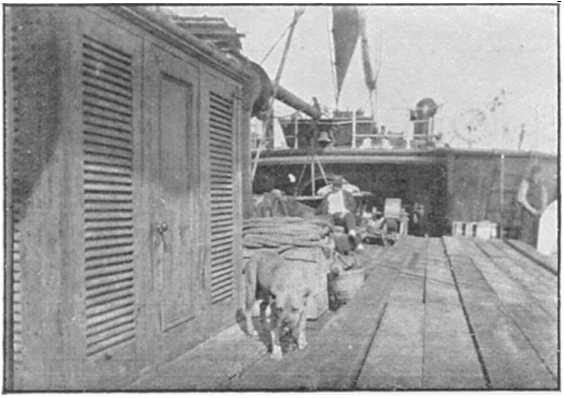
[8] XVII, 180.

[9] Aug., 1896.

PLATE V.



The Terceira Dog.

two dates. The dates 1840, 1834, 1835, are the earliest at which the enumeration of the groups opposite them was made. Of course the sum 366,000 will not be recognized as complete by the student of faunistics, who will claim that many valid species have been described that are not mentioned in the Zoological Record, and if we take estimates into consideration, it may be noted that the late Dr. C. V. Riley estimated that 10,000,000 would not be too great a number to represent the probably existing species of insects alone. If this be a fair estimate for the one group, insects, then, since they seem to represent about two-thirds of the whole, a reasonable estimate for the whole animal kingdom would be about 15,000,000 of species. But at the same time that this estimate is considered, it should be noted that the facts brought to light within the last few years by students of the mechanics of ontogeny and especially by such experiments as those made by Weismann and others in studying the seasonal dimorphism of of Lepidoptera indicate that very many of the species hitherto regarded as valid may be far from valid, and that descriptions of species in the future unless they are based upon a long series of experiments are apt to be much more uncertain than before.

F. C. KENYON.

The Terceira Dog.—While many other dogs of various breeds are seen in Terceira, the yellowish-brown bull dog, often with black face, is so abundant as to be recognized as the characteristic dog of the island. Commonly it stands some two feet high, and while often gentle is frequently very savage. It is said that those intended for watch dogs are trained to jump at a hat held in the hand, in this way learning to spring at a person they attack. When kept chained, and not fondled, they will attack any person approaching, even refusing to recognize their master at night in many cases.

Usually the ears are trimmed round, and the short, deformed tail is docked to a stub, so that these marks are almost as characteristic as those which are hereditary.

Occasionally a dog of this breed is seen on the other islands, Madeira, or the continent, but all that I have ever seen were originally derived from Terceira, and are called Terceira dogs by the Portuguese. The group of these dogs accompanying (Plate V), I owe to Mr. A. E. Cady, of Providence. The single animal I took with a Kodak on a ship in the islands.—WM. TRELEASE.